E-CONSTRUCTION: HOW TECHNOLOGY IS CHANGING PROJECT DELIVERY

George White
CEO, Co-Founder
TRANSPORTATION INFRASTRUCTURE IS FUNDAMENTAL TO OUR WAY OF LIFE.

Why we do what we do...
Our infrastructure is aging...

Sources: Bureau of Economic Analysis, ASCE
MEGA TRENDS SHAPING THE FUTURE

**Massive financing need**
$3.6$ trillion of investment needed by 2020

**Aging Infrastructure**
28+ average age of streets and highways in U.S.

**Bigger, more complex projects**
2mi underground boring Alaskan Way Viaduct

Sources: ASCE; Bureau of Economic Analysis; Press Reports; Q13Fox
MEGA TRENDS SHAPING THE FUTURE

**Sustainability Requirements**
- 50% of solid waste in U.S. is produced by construction industry

**Resource scarcity**
- No. 1 consumer of global raw materials is the construction industry

**Slow permit and approval process**
- $1.2tn of infrastructure would be added by 2030 if all countries committed to specific time limits for approvals

Sources: World Economic Forum; The Boston Consulting Group
MEGA TRENDS SHAPING THE FUTURE

Resilience Challenges

3x as many disasters reported last year as in 1980

Talent and aging workforce leaving

50% of employees eligible for retirement by 2018

Sources: Press reports; World Economic Forum; The Boston Consulting Group
Managing Risk Through Asset Life

Planning ➔ Design and Engineering ➔ Construction ➔ Operations
Managing Risk Through Asset Life (Time, Quality, Cost)

Ease of change

Frequency of changes in traditional process

Cost of change

Leverage Technology to deliver projects faster and more efficiently

Planning ➔ Design and Engineering ➔ Construction ➔ Operations

Source: Adapted from World Economic Forum; The Boston Consulting Group
OPPORTUNITIES TO EVOLVE

**3/25 0800 - 5:00 pm  Seq: 8**

**BASE:** Crew - Damiens

**Sup:** 2 Skill 5 Unskill

**Equip:** 1 Loader 1 Track Hog

**BASE CONSTRUCTIONS:** EXCAVATING TRENCHES FOR 24” RCC PIPE FOR ADJOINING STORM WATER INLETS. These are also being INSTALLED along EBFR US-290 AT APPROX. STA. 1174+00 → 1177+00

---

**8/27 03:00 - 5:00 pm  Seq: 8**

**BASE:** Crews Crew

**Sup:** 1 Skill 4 Unskill 1 Super

**Equip:** 1 Loader 1 Track Hog

**EXCAVATING SOIL FOR INSTALLATION OF (36”) RCC PIPE TO ADJOIN WITH (5x5) STORM BOX LOCATED AT STA. 3143+50 FOR MH-1 TO 1AKS-1 16’ AND GROUTED PIPE AND BOXES

**SEE PLAN SHEET 1141:**

**BASE:** EXCAVATING SOILS FOR INSTALLATION OF (36”) RCC PIPE TO ADJOIN WITH STORM BOX (5x5) LOCATION AT WBFR US-290

---

**8/26 08:00 - 5:00 pm  GAS 05/469**

**BASE:** Damiens Crew
OPPORTUNITY TO CONNECT SILOS
Core Enabling Technologies

User interfaces + applications
Software platform + control
Digital/physical integration

Technology Integrations

Life - Cycle Integrations

Big Data / Analytics
Simulation and V/R
Mobile and A/R
BIM / Cloud
Ubiquitous Connectivity / Tracking
LIDAR / 3D Scanning
UAV
Automation
Embedded Sensors

Cybersecurity

Planning
Design and Engineering
Construction
Operations

Sources: World Economic Forum; The Boston Consulting Group
Opportunities Enabled By Digital

- User interfaces + applications
- Software platform + control
- Digital/physical integration

Real-time data sharing, integration, and coordination across stakeholders

- Data-driven construction planning and lean execution
- New fabrication methods
- Automated and autonomous construction
- Rigorous construction monitoring and surveillance
Collect Data Once, Use Many Times
A mobile first, purpose-built platform to reduce project delivery risk.

- Simplified project inspection
- Real-time communication
- Automated reporting
- Digitized workflows
- Information flow for collaboration
Real-Time Communication Among Stakeholders

Inspectors
Field Staff

Design Engineers
Project Engineers
Resident Engineers
Office Personnel
Simplify Data Collection
Automate Reporting and Enhance Workflows

Final Records System
Collaboratively Track and Manage Issues
Discover Trends and Identify Potential Issues

Turning Data Into Information
Improve Project Intelligence

Observation Activity
7,023 observations were captured last week on 47 active projects. 1,473 photos and videos were uploaded.

Document Activity
263 documents were submitted on 35 projects out of 47 active projects. 60 of these documents have been approved. There were 67 users who submitted documents out of 91 users who took observations.
And turn into Asset Intelligence
Information Enabled By Digital

- Warehousing Collected Data
- Real-Time Access
- Communication\Collaboration

- Claims Abatement
- Risk Reporting
- Owner\Contractor Reporting

- Past Performance Analytics
- Real-time Data Analysis

Communication  Information  Insights
## Benefits To Be Realized

<table>
<thead>
<tr>
<th></th>
<th>Office building</th>
<th>Highway</th>
<th>Power plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact on life cycle cost (%)</td>
<td>-15%</td>
<td>-16%</td>
<td>-12%</td>
</tr>
<tr>
<td>• Design and engineering</td>
<td>±0%</td>
<td>±0%</td>
<td>-5%</td>
</tr>
<tr>
<td>• Construction</td>
<td>-12%</td>
<td>-19%</td>
<td>-14%</td>
</tr>
<tr>
<td>• Operations</td>
<td>-18%</td>
<td>-10%</td>
<td>-10%</td>
</tr>
<tr>
<td>Impact on construction time (%)</td>
<td>-30%</td>
<td>-23%</td>
<td>-15%</td>
</tr>
</tbody>
</table>

Source: IHS; The Boston Consulting Group
## Benefits To Be Realized

### Highway

| Impact on life cycle cost (%) |  
|------------------------------|---|
| **• Design and engineering** | ±0% |
| **• Construction**           | -19% |
| **• Operations**             | -10% |

| Impact on construction time (%) |  
|----------------------------------|---|
| **-23%**                         |  

Source: CBO – Public Spending on Infrastructure March 2015 (Highway/Transit/Ferry)

$24.1$ Billion Annually
Most companies find the biggest innovation challenge is executing change to their people and processes.
Why Is Change Difficult?
Expectations vs. Reality

Source: John Kotter International
Managing Change: Shifting Focus of Activities
7 Critical Success Factors

1. Vision, value, and success metrics
2. Strong sponsorship (HQ and region-level)
3. Energy level
4. Thoughtful deployment (planning, communication, training, and support)
5. Peer ambassadors
6. Feedback and responsiveness
7. Continuous improvement
Become a Technology Evangelist Pragmatist

• Drive your workflows to digital at point of collection
• Identify business impact and choose open platforms
• Partner with technology providers that understand change management